

## CHAPTER 5

### Assessment of livelihood asset, food security and coping strategies

#### 5.1 Livelihood asset in differences farm types

The examination of these three farm types was used the livelihood asset category: human capital, natural capital, financial capital, physical capital and social capital to understand real situation of food insecurity in this region. According to this survey and in-depth interview of farmer household could explain the food insecurity among different types.

Base on household livelihood asset five categories could explain whether differences farm types that had different the way of coping strategies and asset availabilities in each farm types. The farmers used their household livelihood assets in the case of emergency while farmers used their saving (animals, land, housing, their assets, crop production, and others) and sold their livestock or their assets for buying food during food shortage periods. Farmers used their livelihood assets for coping with food insecurity as well as for their resiliencies from farm productions and vulnerability to shock. Livelihood assets of three farm types explored as well as detail below:

##### 5.1.1 Human capital

From the survey found that had different characteristic of each farm types. The education, skills, knowledge, and health were various from these three farm types. Therefore, livelihood asset was affecting to farmer's ability to cope to food insecurity and their resiliencies. In upland rice subsistence farming (UR) found that farmers had given first priority for the children education. This farm type was laying on their traditional knowledge and skills of farm production from their family and traditional cultivation in their communities in the village. Farmers had cultivated more than one cropping pattern in the seasonal.

Upland rice with rubber plantation (URRP) found that farmer had to use their ability of household member (labours), ability of skills and more work in the farm. This farm types had two distinguish working target: first working for food crop production (rice production), cash crop (maize, job's tear and others) and secondary working for rubber plantation. In this farm type explored to risk of health situation due to had more working in the farm. Farmers in rubber plantation had to consider working in the rubber farm more than other farm types. This farm type, farmers had lacked to produced or inter-cropping other crops in the rubber plant. Because of rubber was fully growth of plant canopy (table 5.1).

**Table 5.1 Characteristic of human capital on differences farm types**

<b>Human capital</b>	<b>(A)UR (n=60)</b>	<b>(B)URRP (n=60)</b>	<b>(C)RP (n=60)</b>
Household size	small size (2-3 people)	medium size (4-5 people)	Large size (above 6 people)
Health status	few sickness, some flu, and access to district hospital	few sickness, some flu, and access to district hospital	few sickness, some flu, and access to district hospital
Education level	Primary school and secondary school	Primary school and secondary school	Primary school and secondary school
Farmer knowledge level	Traditional knowledge	Traditional knowledge	Traditional knowledge
Access to information	Radio, village information, farmer community	Radio, village information, farmer community	Radio, village information, farmer community
Access to school	primary school at village and secondary school at district	primary school at village and secondary school at district	primary school at village and secondary school at district

**Source:** Focus group discussion (2014)

The human capital is about farmers, who had the skills, knowledge, abilities to working and good health that more important to has the ability to pursue different livelihood

strategies. Household member played an important role in the farm productivities and farming pattern during the seasonal of crops production. Human capital was ability of farmer to produce and select suitable cropping pattern in the farm field.

The household livelihood asset was capability of farmers to cope within risk context of food insecurity due to exposure by food shortage, flooding and drought. These problems had become the vulnerability to shock in the farmers' households. From household focus group discussion food security and household asset had good link between food security categories (food availability, food access, food utilization and stability) and livelihood asset category (five capitals: human capital, natural capital, financial capital, physical capital and social capital).

The human capital was about farmers, who had the education, skills, knowledge to working and good health that more important to had the ability to pursue different livelihood strategies. In this study found that skills and knowledge were not significances different between three farm types: upland rice with cash crop (UR), upland rice with rubber plantation (URRP) and rubber plantation (RP). The education levels of farmers had significances at 5% which rubber plantation farming had greater education than Upland rice with cash crop and Upland rice with rubber (table 5.1 and table 5.2).

**Table 5.2 Comparison means of livelihood asset (human capital) of each farm type in the upland farming systems**

Human capital	Farm types			F-test at significance level
	(A)UR (n=60)	(B)URRP (n=60)	(C)RP (n=60)	
1. Education levels	1.78	1.97 <sup>a</sup>	2.13 <sup>a</sup>	0.001**
2. Farm knowledge	2.45	2.67	2.55	0.106
3. Farmer's skill	2.42	2.67	2.48	0.062
4. Farmer health	2.52	2.73	2.67	0.092

**Note:** \*\* F-test statistically significant at 5%; (<sup>a</sup>) Significant differences from UR farming type

**Source:** Field survey (2014)

Farmer's age, gender (male and female) and land holding were significances different between three farm types (Upland rice with cash crop, Upland rice with rubber and Rubber) as shown in Table 5.3. The farmer's age of rubber plantation farming had older age 44.57 than upland rice with rubber plantation 42.08 and upland rice had youngest age 38.15 year old. The gender (male and female) of rubber plantation farming had (male 3.22 persons and female 3.22 persons) than upland rice with rubber plantation (male 2.72 persons and female 2.78 persons) and upland rice had (male 2.55 persons and female 2.30 persons). The over all, rubber plantation had high risk in the farming systems while mono cropping had only income from rubber when come pared to upland rice with cash crop and upland rice with rubber plantation.

**Table 5.3 Comparison means of farmer's household of each farm type in the upland farming systems**

Farmer profile	Farm types			F-test at significance level
	(A)UR (n=60)	(B)URRP (n=60)	(C)RP (n=60)	
1. Farmer (Age)	38.15	42.08 <sup>a</sup>	44.57 <sup>a</sup>	0.008**
2. Family member(Male)	2.55	2.72 <sup>a</sup>	3.22 <sup>a</sup>	0.001**
3. Family member(Female)	2.30	2.78 <sup>a</sup>	2.15 <sup>a</sup>	0.002**

**Note:** \*\* F-test statistically significant at 5%; (<sup>a</sup>) Significant differences from UR farming type

**Source:** Field survey (2014)

### 5.1.2 Natural capital

The natural resource stocks from which resource flows useful for livelihoods are derived (e.g. land, water, wildlife, biodiversity, environmental resources). Forest protection areas played an important role for the communities in the village to provide secondary food sources, nutrition (wild vegetables), water resources (river from mountain) and non-timber products (NTFPs). The NTFPs was contributed a household

income and cope to food insecurity. These three farm type shared the natural resources in the village communities.

From survey found that natural capital as water resources (river) had potential for expansion crop production areas for increasing food availability in the province as well as for meet the household consumption needs. Land areas were mostly sloping terrain which the top of mountain was forestry protection areas. Rubber plantation was found in steeped areas that were occupied by rubber plantation, maize and job's tear. Upland rice was cultivated as sloping areas, sloping terrain and nearby river basin which farmers grow more paddy rice. These three farm types showed differences characteristic of natural resources used (Table 5.4).

**Table 5.4 Characteristic of natural capital on differences farm types**

<b>Natural capital</b>	<b>(A)UR (n=60)</b>	<b>(B)URRP (n=60)</b>	<b>(C)RP (n=60)</b>
Natural resources	Access to NTFPs, water resources, forest	Access to NTFPs, water resources, forest	Access to NTFPs, water resources, forest
Soil fertility	moderate, soil erosion, crop rotation	moderate, soil erosion	farmer improved soil fertility by adding fertilizer for rubber plantation
Land holding	large size of biodiversity on crop production	farmer divided land into on crop production and rubber plantation	only rubber plantation and limited to cultivate other crops

**Source:** Focus group discussion (2014)

The natural resource stocks from which resource flows useful for livelihoods were natural resources (water, wildlife, biodiversity, environmental resources) and soil

fertility. From this survey, natural capital was not significantly different between three farm types (Upland rice with cash crop, Upland rice with rubber and Rubber) as shown in Table 5.5. The land holding of upland rice with rubber plantation had larger land areas 1.59 ha than upland rice 1.43 ha and had rubber plantation farming 1.08 ha.

**Table 5.5 Comparison means of livelihood asset (natural capital) of each farm type in the upland farming systems**

Natural capital	Farm types			F-test at significance level
	(A)UR (n=60)	(B)URRP (n=60)	(C)RP (n=60)	
1. Natural resources	2.75	2.83	2.83	0.572
2. Soil fertility	2.65	2.82	2.80	0.147
3. Land holding (ha)	1.43	1.59 <sup>a</sup>	1.08 <sup>a</sup>	0.000**

**Note:** \*\* F-test statistically significant at 5%; (<sup>a</sup>) Significant differences from UR farming type

**Source:** Field survey (2014)

### 5.1.3 Financial capital

Financial capital refers to the availability of cash equivalents that farmers had earned from farm production and off-farm production. This financial capital was enabling the farmers to saving their livelihood assets and used for buying food for household consumption. In survey found that each farm type had differences livelihood strategies to earn, save and expenditure. This can reliable from farmer's ability and opportunity to get profit from farm production.

Household's income depended on crop production, rubber products and rice production (provided food for among family member). From these three farm types showed that financial capital was relatively to decreased vulnerability to food insecurity that was particularly during the exposure to shock (flooding, drought) or rice deficit (table 5.6). The financial resource was available capital to people (whether savings, supplies of credit or regular remittances or pensions) and which provide them with different livelihood options.

**Table 5.6 Characteristic of financial capital on differences farm types**

<b>Financial capital</b>	<b>(A)UR (n=60)</b>	<b>(B)URRP (n=60)</b>	<b>(C)RP (n=60)</b>
House saving	from farm income	from farm income	from farm income
Roam bank	Buying seed, fertilizer	Buying seed, seedling, fertilizer	Buying seed, seedling, fertilizer and planting
Household income	income from crop production	income from crop production	income from rubber production
Household net-income	Balanced from household income minus on food expenditure	Balanced from household income minus on food expenditure	Balanced from household income minus on food expenditure
Household expenditure on food	Buying some foods	Buying some foods	Buying rice for household consumption and foods
Access to market	Village market pond twice per week, and district market distance	Village market pond twice per week, and district market distance	Village market pond twice per week, and district market distance

**Source:** Focus group discussion (2014)

The financial resource was available capital to people (whether savings, supplies of credit or regular remittances or pensions) and which provide them with different livelihood options. From the survey, financial capital were not significances different between three farm types (Upland rice with cash crop, Upland rice with rubber and

Rubber) as shown in Table 5.6. Farmer's household income such as total income, net-income and household expenditure on food: total household income of upland rice had better income 122.70 \*100,000Kip than upland rice with rubber plantation 75.82 \*100,000Kip and had rubber plantation farming 72.92 \*100,000Kip.

The net-income of upland rice had greater net-income 88.12 \*100,000Kip than upland rice with rubber plantation 44.88 \*100,000Kip and had rubber plantation farming 23.10 \*100,000Kip. The household expenditures on foods of upland rice with rubber plantation had less expenditure 11.50 \*100,000Kip than upland rice with rubber plantation 12.48 \*100,000Kip and had rubber plantation farming 33.94 \*100,000Kip. There had significant level at 5%. The farmer's household income (total income, net-income and household expenditure on food) were observed (Table 5.7). Farmers used their experiences to cope to risk of food insecurity by borrowing or rent the land for cultivating rice for household consumption due to fluctuate prices of rubber in the market

**Table 5.7 Comparison means of livelihood asset (financial Capital) of each farm type in the upland farming systems**

Financial Capital	Farm types			F-test at significance level
	(A)UR (n=60)	(B)URRP (n=60)	(C)RP (n=60)	
1. Household saving	2.53	2.53	2.62	0.711
2. Roam bank	2.05	2.28	2.22	0.254
3. Total household income *	122.70	75.82 <sup>a</sup>	72.92 <sup>a</sup>	0.000**
4. Household Net-income *	88.12	44.88 <sup>a</sup>	23.10 <sup>a</sup>	0.000**
5. Household-expenditure on foods *	12.48	11.50 <sup>a</sup>	33.94 <sup>a</sup>	0.000**

**Note:** \*\* F-test statistically significant at 5%; (<sup>a</sup>) Significant differences from UR farming type

\* Total household income x 100,000Kip; Household net-income x 100,000Kip; Household-expenditure on foods x 100,000Kip

**Source:** Field survey (2014)



#### 5.1.4 Physical capital

From survey found that farmers from three farm types had a good accessibility to roads, schools, health care and market. Farmers could access to markets by two ways: first local market at village (opened twice per week) and second markets at district (around 10-15 km from the village). Physical capital was direct key important for farmer's productivity, farm gate, supplied crop production to market, and roads network between people villages and districts. Physical capital of three farm types were slightly differences (Table 5.8).

**Table 5.8 Characteristic of physical capital on differences farm types**

Physical capital	(A)UR (n=60)	(B)URRP (n=60)	(C)RP (n=60)
Water	water stream, fish pond	water stream, fish pond	water stream
Road	Poor road (dirt road)	Dirt road, asphalt road	Dirt road, asphalt road
School	Small primary school at village	Small primary school at village	Small primary school at village
Health care	Access to health care service at district	Access to health care service at district	Access to health care service at district

**Source:** Focus group discussion (2014)

The basic infrastructure (transport, shelter, water, energy and communications) and the production equipment enable people to pursue livelihoods. From this survey, physical capital such as access to road, access to water, access to electricity, access to school and Village information were not significances different between three farm types (Upland rice with cash crop, Upland rice with rubber and Rubber) as shown in Table 5.9. The health care and technical support were significant level at 5% that Upland rice with rubber had better health care and technical supported than rubber plantation farming and upland rice.

**Table 5.9 Comparison means of physical capital of each farm type in the upland farming systems**

Physical capital	Farm types			F-test at significance level
	(A)UR (n=60)	(B)URRP (n=60)	(C)RP (n=60)	
1. Road	2.60	2.68	2.73	0.432
2. water	2.63	2.85	2.80	0.072
3. Electricity	2.72	2.88	2.82	0.167
4. School	2.67	2.87	2.83	0.068
5. Health care	2.62	2.87 <sup>a</sup>	2.77 <sup>a</sup>	0.032**
6. Technical support from DAO	2.57	2.85 <sup>a</sup>	2.72 <sup>a</sup>	0.016**
7. Village information	2.58	2.73	2.75	0.191

**Note:** \*\* F-test statistically significant at 5%; (<sup>a</sup>) Significant differences from UR farming type

**Source:** Field survey (2014)

#### 5.1.5 Social capital

The social capital refers to all the social resources (networks, membership of groups, relationships of trust, access to wider institutions of society). Social capital was associations such as village communities, ethnic groups, collaborate within between farmers. From survey found that ethnic group minorities were Lao-loum, Khmu and Hmong. The villager communities hold important role in the social capital that enhance to improve the household resilience to food insecurity.

However, communication of farmers in the village had great opportunity to increase their crop production, participations between farmers and to improve market accessibility. This livelihood outcome had seen the connecting between village's communities that could enhance of the household income and reduced of risk to food insecurity (Table 5.10).

**Table 5.10 Characteristic of social capital on differences farm types**

<b>Social capital</b>	<b>(A)UR (n=60)</b>	<b>(B)URRP (n=60)</b>	<b>(C)RP (n=60)</b>
Farmer rice fund	Farmers shared some rice production at village level	Farmers shared some rice production at village level	Farmers purchased rice from village level or relative farmer
Farmer cash crop fund	Farmers shared some seed, fertilizer at village level	Farmers shared some seed, seedling, fertilizer at village level	Farmers shared some seedling, fertilizer at village level
Government support	Cultivation technique, key information on crop production	Cultivation technique, key information on crop production	Cultivation technique, key information on crop production
NGOs support	some funding on cultivation	some funding on cultivation	some funding on cultivation

**Source:** Focus group discussion (2014)

From this survey, social capital such as farmer rice fund, cash crop fund, government supported and NGOs supported were not significances different between three farm types (Upland rice with cash crop, Upland rice with rubber and Rubber) as shown in Table 5.11. The social capital is about farmers, who had the social resources (networks, membership of groups, relationships of trust, access to wider institutions of society) upon which people draw in pursuit of livelihoods.

**Table 5.11 Comparison means of livelihood asset (social capital) of each farm type in the upland farming systems**

Social Capital	Farm types			F-test at significance level
	(A)UR (n=60)	(B)URRP (n=60)	(C)RP (n=60)	
1. Farmer rice fund	2.50	2.53	2.48	0.902
2. Farmer cash crop fund	2.45	2.55	2.50	0.687
3. Government support *	393.75	411.25	405.42	0.741
4. NGOs support *	373.33	382.08	364.58	0.796

**Note:** \*\* F-test statistically significant at 5%

\* Government support x 1,000Kip; NGOs support x 1,000Kip

**Source:** Field survey (2014)

## 5.2 Assessment of household livelihood assets in differences farm types

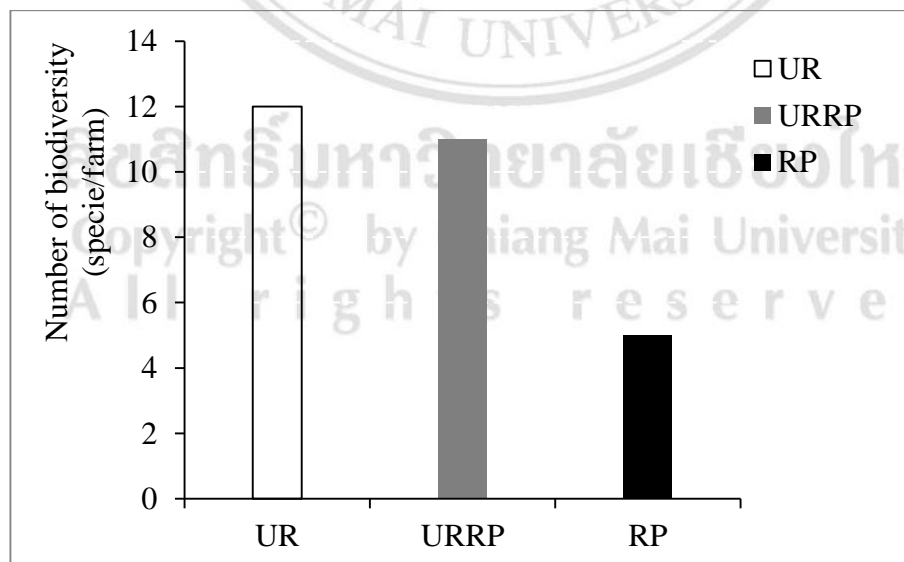
The examination of these three farm types were used the livelihood asset category (five capitals: human capital, natural capital, financial capital, physical capital and social capital) to understand real situation of food insecurity in this region. According to this survey and in-depth interview of farmer household could explain the food insecurity among different types. Upland rice and paddy rice were main sources of food and secure for many households that before the rubber plantation was established. Other crop such maize, job's tear and non-timber products were second sources of household income and saved money for used in case of emergency as sickness, pay for children go to school, household expenditure and buy rice when upland rice produced insufficiencies for their households.

The proportion of agricultural land and rubber plantation areas had shown an important scenario on food crop production and commercial crop as maize, job's tear and rubber plantation. The agricultural land took over 65% and rubber plantation has only 35% of total land use in Namor and Xay district. Currently, three farm types had good ratio of land use and food crop production which upland rice and paddy rice field had 30%.

### 5.3 Household food security

#### 5.3.1 Food availability

This study was a regarding to food security definition from FAO (2006). From survey found that has been changing on upland agriculture practices from past to present into positively and negatively way on food security in this study area. The number of biodiversity shown that upland rice subsistence farming system (UR) had greater biodiversity of species in the farm (12 species per farm). The upland rice with young rubber plants farming system (URRP) was 11 species per farm, and rubber plantation farming systems (RP) was lowest biodiversity (5 species per farm) in respectively (Figure 5.1). The upland rice subsistence farming system (UR) cultivated upland rice which rotation with cash crops such as: maize, job's tear and etc. NTFPs (Bamboo shoot and wild vegetables) were widely food sources for UR, URRP and RP that could collect from forestry areas near by the villages. Many households used NTFPs as well as food consumption and sold NTFPs for generating income during the dry season. This off-farm income, farmers used for buying the rice during the rice shortage period and also for their households saving. Pig and poultry were found in all farm types that farmers raised a small scale of livestock. This livestock was used only for daily household consumption.



**Figure 5.1** The number of biodiversity of each farm type

**Source:** Focus group discussion (2014)

The rice production was widely providing the food available for people and communities, while rice production is a most important for household consumption. Upland rice and paddy rice were grown during the wet season periods in the upland. Rice production was a primary food source for several farmers' households. This survey found that rice production was cultivated in both farming types: the upland rice subsistence farming system (UR) and the upland rice with young rubber plants farming system (URRP).

The proportion of rice production was categorized into three levels that farmer cultivated rice production in the farm field that got a yield below 1 ton of per household, 1-2 ton per household, and above 3 ton per household as respectively. The URRP and UR farming types were fall into second level about 1-2 ton per household which had highest number of households for URRP 44 households around 73.3 percent, and UR 39 households around 65 percent in respectively.

The yield of rice production was below 1 ton per household that found in UR one household around 1.7 percent, and URRP one household around 1.7 percent (Table 5.12). RP was laying on purchasing rice production from market and farm neighbors in the village. The most of households was purchased rice for household consumption about 1-2 ton per household which had highest number of households around 100 percent.

Rubber plantation farming system (RP) was lack opportunity to had rice cultivation for their own farms. Due to rubber plant had fully grow and plant canopy covering all areas that could not cultivate or plant any small plants under shading of rubber plant. The most of farmers in rubber plantation (RP) had been purchased or brought rice from other farmers in UR farming system or in market at district.

Nevertheless, RP farming system was sold rubber latex as well as for farm income and used this farm income for purchased food consumption for their household. Farmers in RP farming type had to buy or purchase yearly of rice for household consumption (Table 5.12).

**Table 5.12 Number of rice self-production and rice buying for household**

Rice	(A)UR (n=60)		(B)URRP (n=60)		(C)RP (n=60)	
	No.	%	No.	%	No.	%
<i>Rice production from farm</i>						
<1 ton/household	1	1.7	1	1.7	-	-
1-2 ton/household	39	65	44	73.3	-	-
3=> ton/household	20	33.3	15	25	-	-
<b>Total</b>	<b>60</b>	<b>100</b>	<b>60</b>	<b>100</b>	<b>-</b>	<b>-</b>
<i>Buying or purchasing rice</i>						
<1 ton/household	-	-	-	-	-	-
1-2 ton/household	-	-	-	-	60	100
3=> ton/household	-	-	-	-	-	-
<b>Total</b>					<b>60</b>	<b>100</b>

**Source:** Field survey (2014)

### 5.3.2 Food accessibility

The assessment of three farm types (UR, URRP and RP) had differences in the weakness and strengthens that could bring positive and negative of the impact on food security on long period of household food security. According to FAO definition (2003), the food accessibility was depended on the accessibility to market, available clean water used, easy access to main road, and access to health care in the district. Retailer shops were necessary place to collect or buy food for household consumption within their communities.

From this survey, every village in Xay district and Namor district had twice of times for opening traditional local market in their villages for selling and buying food crops, clothes and farm equipments from district traders. Food products were sold in the market such as rice, pig, poultry, finish, bamboo shoot, mushroom, wild vegetables (NTFPs), and some vegetables such as cucumber, pumpkin, melon, mustard leaf, and

other vegetables. All farmers of three farm types had opportunity to collect or buy from this market for household food consumption.

The accessibility of three farming types (UR, URRP and RP) to roads was categorized into three levels: 1) poor road (dirt road), 2) asphaltic road and 3) main road. The farmers used these roads for accessing to markets, schools, health care, transporting crop production from farm to home and also to market. The most of farmers of three farming types had their farm field near to main road that highest of number household was shown in RP farming type about 46 households around 76.7 percent, URRP farming type about 44 households around 73.3 percent, and UR farming type about 40 households around 66.7 percent in respectively. The highest accessibility of farm household to dirt road was found in UR farming type about 4 households around 6.7 percent.

The accessibility to health care service was categorized into three levels: 1) poor health care service (difficult or far from hospital in the district), 2) fair (access to available health care within village) and 3) good health care service (near to hospital in the district). The farmers could have a good access to health care that found highest in URRP farming type about 53 households around 88.3 percent, RP farming type about 46 households around 80 percent, and UR farming type about 40 households around 66.7 percent in respectively. The poorest accessibility of number household to health care service was found in UR farming type about 5 households around 8.3 percent, URRP farming type about one household around 1.7 percent, and RP farming type about 2 households around 3.3 percent in respectively (Table 5.13).

The accessibility to clean water was categorized into three levels: 1) poor water source (far from village or limited of clean water used), 2) fair (access to available water source within village) and 3) good clean water source (had available clean water reservoir nearby village with good pip systems). The farmers could have a good access to clean water source that found highest in URRP farming type about 53 households around 88.3 percent, RP farming type about 50 households around 83.3 percent, and UR farming type about 44 households around 73.3 percent in respectively.

The poorest accessibility of number household to clean water source was found in UR farming type about 6 households around 10 percent, URRP farming type about 2



household around 3.3 percent, and RP farming type about 2 households around 3.3 percent as respectively (Table 5.13).

**Table 5.13 Household accessibility in three farm types**

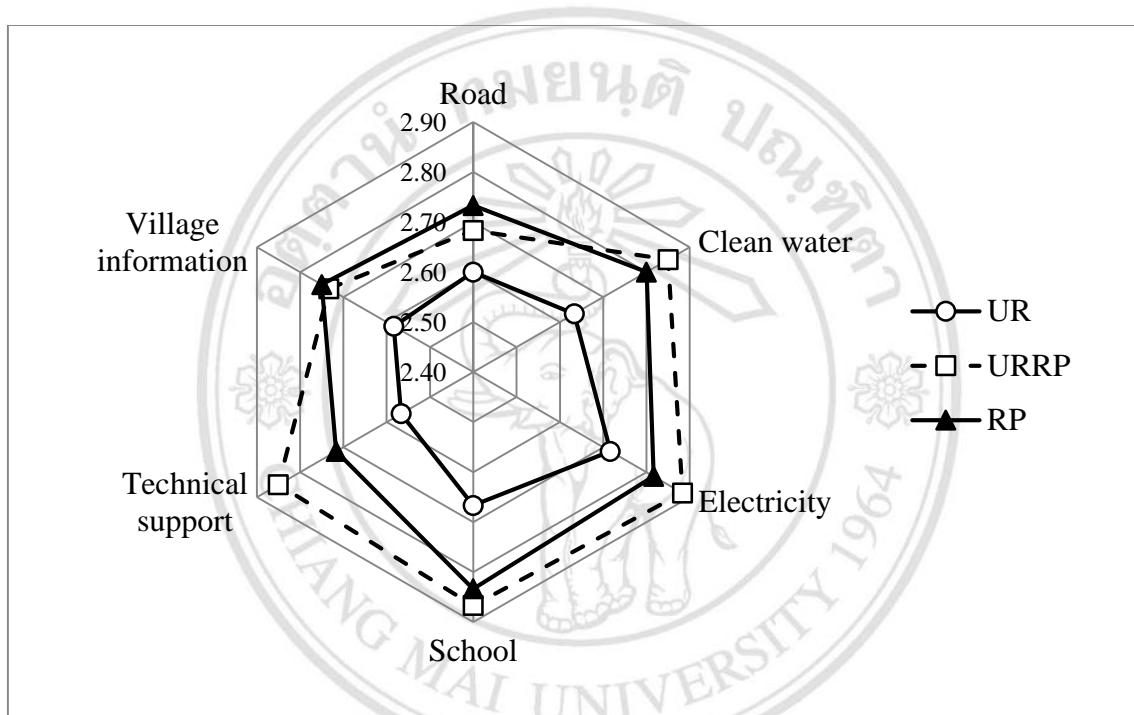
Accessibilities	UR (n=60)		URRP (n=60)		RP (n=60)	
	No.	%	No.	%	No.	%
<i>Road</i>						
Dirt road	4	6.7	3	5.0	2	3.3
Asphaltic road	16	26.7	13	21.7	12	20.0
Main road	40	66.7	44	73.3	46	76.7
<b>Total</b>	<b>60</b>	<b>100</b>	<b>60</b>	<b>100</b>	<b>60</b>	<b>100</b>
<i>health care</i>						
Poor	5	8.3	1	1.7	2	3.3
Fair	13	21.7	6	10.0	12	16.7
Good	42	70.0	53	88.3	46	80.0
<b>Total</b>	<b>60</b>	<b>100</b>	<b>60</b>	<b>100</b>	<b>60</b>	<b>100</b>
<i>Water</i>						
Poor	6	10.0	2	3.3	2	3.3
Fair	10	16.7	5	8.3	8	13.3
Good	44	73.3	53	88.3	50	83.3
<b>Total</b>	<b>60</b>	<b>100</b>	<b>60</b>	<b>100</b>	<b>60</b>	<b>100</b>

**Source:** Field survey (2014)

The assessment score of overall accessibilities of three farming type to clean water source, electricity, roads, technical support, school, and village information (Figure 5.2). Three farm types shared the similar facility in the villages. The upland rice with rubber plantation farming type (URRP) and rubber plantation (RP) had slightly greater than upland rice subsistence farming (UR) such as: access to good road (2.75), clean water source (2.8), electricity (2.89), school (2.88), and village information (2.75) in respectively. URRP farming type had slightly greater technical support around 2.85 than RP farming type (2.72) and UR farming type (2.48) in respectively. The UR farming type was poorest accessibility that showed in access to good road around (2.60), clean water source around (2.65), electricity around (2.72), school around (2.68), technical

support around (2.48) and village information around (2.49) of the total household from this survey in respectively.

The detail of data was shown in figure 5.2. However, farmers in URRP and RP farming type had slightly better accessibility to all village facilities than UR farming type. Therefore, many rubber plantations were found nearby along the main road and the road within villages.



**Figure 5.2** The farmer's accessibility of each farm type

**Source:** Field survey (2014)

### 5.3.3 Food utilization

According to FAO definition (2006) found that household food utilization was falling into adequate food diet, clean water, health care, physical needs and diversity of food consumption. Firstly, the sustainable of food crop production was dominated to promote household food production such rice production, vegetables, pig and poultry in the province. Land use management for food crop production. Therefore, land use transformation has to concern about land use for growing food crop, increasing crop productivities, declining vulnerability to food insecurity.

From the survey found that total farm-income showed dominances significant to secure their household welfare and household livelihood on their household expenditure. The highest of total household income was UR farming type and URRP farming type.

UR farming type showed much diversified of total household income that minimum was about 29.5\*10,000 Kip per household per yearly and maximum was 254\*10,000 Kip per household per yearly (standard deviation SD  $\pm$  52.1). URRP farming type had shown similarity to UR farming type that minimum was about 27.0\*10,000 Kip per household per yearly and maximum was 225\*10,000 Kip per household per yearly (standard deviation SD  $\pm$  40.2). The average of total household income was UR farming type about 122.7\*10,000 Kip per household per yearly and URRP farming type about 75.8\*10,000 Kip per household per yearly (Table 5.14).

The UR farming type was spend slightly a little of household expenditure on food that minimum was about 2.0\*10,000 Kip per household per yearly and maximum was 40\*10,000 Kip per household per yearly (standard deviation SD  $\pm$  10.0). URRP farming type had shown quite the same as UR farming type that minimum was 3.0\*10,000 Kip per household per yearly and maximum was 30\*10,000 Kip per household per yearly (standard deviation SD  $\pm$  6.6). RP farming type was highest of household expenditure on food that minimum was 30\*10,000 Kip per household per yearly and maximum was 47\*10,000 Kip per household per yearly (standard deviation SD  $\pm$  3.8). The average of total household expenditure on food was UR farming type about 12.5\*10,000 Kip, URRP farming type about 11.5\*10,000 Kip and RP about 33.9\*10,000 Kip per household per yearly (Table 5.14).

However, UR farming type had highest household net-income than URRP and RP farming type. The average of total household net-income was UR farming type about 110.2\*10,000 Kip, URRP farming type about 64.3\*10,000 Kip and RP about 39.0\*10,000 Kip per household per yearly as respectively (Table 5.14). The household net-income was calculated only minus from household expenditure on food. UR and URRP had better opportunity to cultivate the rice production and to raise pig and poultry in their farms. RP farming type was limited to cultivate and without to raise pig and poultry in their farms.

**Table 5.14 The household expenditure of each farm type**

Household profitability	Farm types (*10,000Kip/HH)		
	(A)UR (n=60)	(B)URRP (n=60)	(C)RP (n=60)
<i>Total household income</i>			
Minimum	29.5	27.0	40.3
Maximum	254.0	225.0	163.3
Mean	122.7	75.8	72.9
Standard deviation (SD)	52.1	40.2	30.5
<i>Household expenditure on food</i>			
Minimum	2.0	3.0	30.0
Maximum	40.0	30.0	47.0
Mean	12.5	11.5	33.9
Standard deviation (SD)	10.0	6.6	3.8
<i>Household net-income*</i>			
Minimum	27.5	24.0	10.3
Maximum	214.0	195.0	116.3
Mean	110.2	64.3	39.0
Standard deviation (SD)	49.6	37.5	29.5

**Source:** Field survey (2014)

**Note:** \* Total income minus expenditure for food

#### 5.4 Assessment of household food security

The overall assessments of three farming types found that UR farming type was greater in term of food security (food availability, food access, food utilization, and food sustainability for their households). URRP farming type had lack of sustainability for long run of food crop production for all communities in the villages by decreasing of rice production over time due to rubber plantation expanded through both districts: Xay and Namor district. RP farming type had only one of opportunity of food access in these two districts (Table 5.15).

**Table 5.15 Assessment of household food security in three farm types**

Food security	Farm type		
	(A) UR	(B) URRP	(C) RP
Food availability	✓	✓	X
Food access	✓	✓	✓
Food utilization	✓	✓	X
Food sustainability	✓	X	X

**Source:** Focus group discussion (2014)

(✓) Household with self-food production and less household expenditure on food

(x) Household had to buy for consumption

Many people were poor and low household income, which livelihood depends on collected non-timber forest and cultivated upland rice. This resulting was shown in food insecurity for their household. In contrast, RP farming type was good for long term to recover the fallow lands and expand green land in the district as well as recover the forestry areas.

Non-timber forest products (NTFPs) such as bamboo shoot and wild vegetables were secondary food source. Farmers had also sold NTFPs as well as generating income for buying rice during the insufficient of household rice consumption. NTPFs were used as well as for household food availability in the villages.

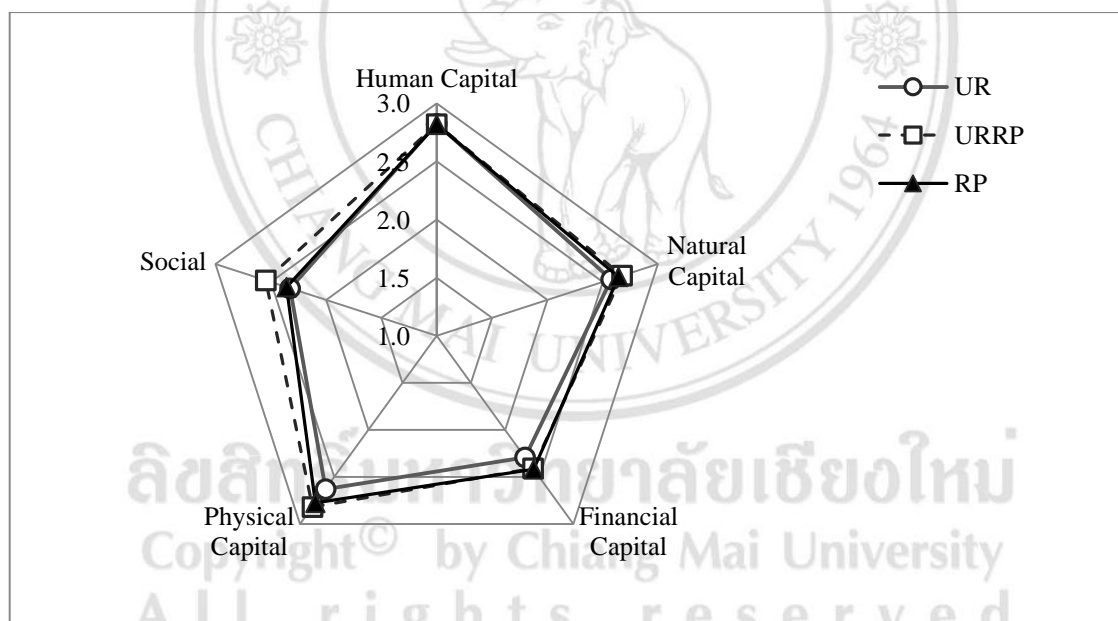
Sustainable of food crop production promotes in the province. Land use management for food crop production. Therefore, land use transformation has to concern about land use for growing food crop, increasing crop productivities, declining vulnerability to food insecurity and need good management on land use.

However, the tradition agricultural farming system as well as UR farming type was one of existing mixing cropping pattern systems in the upland areas. This method had been using for long time and had to shift the cultivate land after planted upland rice or maize and job's tear in yearly. The soil fertility has been decreasing over time during their cultivation crops. Farmers had to look for new land for better soil fertility and best

yield. The shifting cultivation was used slash and burn method that it had a problem to environmental and reduced forestry land.

### 5.5 Coping strategies of different farm types

The coping strategies were relatively to enable the ability of household to cultivate crop production in the farm field and off-farm income. The ability of farmers cultivated and expanded with larger fields and more cropping pattern in the seasonal. Having the great livelihood assets and food security needed the proper cropping pattern and various of crops production in the farm. These outcome regarded to require enough food for household through farm production such as rice production, livestock, home-garden vegetable, maize and job's tear that farmer could used these farm production as well as their livelihood assets to cope to risk in food insecurity.



**Figure 5.3** The comparison of household livelihood assets in each farm types

**Source:** From field survey (2014)

The household livelihood assets determined the potential of farmers to solve the periods of food shortage. However, the five livelihood capital such as human capital, natural capital, financial capital, physical capital and social capital that was slightly different between three farm types (Figure 5.4). From this survey found that each farm types were facing in differences way to cope to risk of food security. The household had to

maintain their food crop production and reduce risk from their farms investment and good profits for their households.

In this survey found that farm productivity and cropping pattern were main majority of households to provide the enough food for family through the year. The volume of food produced from farm production which could determine the self-sufficient in the household as well as food consumption. If amount of food from previous year was not enough for household consumption that farmer had various ways to cope to risk of food insecurity such as earn money from off-farm income (working in other owner farm as hired labour and collecting non-timber forest products from forestry protection areas nearby the village). The livelihood assets determined the ability to cope the risk of food insecurity in these three farm types as in figure 5.7.

#### 5.5.1 The upland rice subsistence farming (UR)

UR farming type was cultivated rice and maize or job's tear. This farm type had greater coping strategy. In this case, farmers had multiple alternatively to produce other crop that provided good sources income for purchase or buy food when farmers produce not enough rice for household consumption. Vegetables were grown in their home garden as household consumption during from rainy season (June to September) to early of dry season (October to December).

Livestock was part of their assets such as pig, chicken and duck which found surround in the villages. In term of natural resources, non-timber forest products play a good role for the village communities for provide food and cash income. Even through, farmer had to shift their farm field or crop rotation to maintain the soil fertility and good yield. In this farm type has various farm activities, because they had to organize the working times and manage of their farm production such rice production with maize or job's tear.

The maize and job's tear were supported crops for household income and sold production for buy rice and food for household during the period of rice shortage through year. Flooding and drought were main exposure to risk of food insecurity in this farm types.

**Table 5.16 Household future coping strategy in UR farming type**

Farm type	(A) Upland rice subsistence farm (UR)
<i>Future coping strategy</i>	<ul style="list-style-type: none"> <li>• Allocate land for food crop and other crops production</li> <li>• Increased productivity and get more profits from crop production</li> <li>• Seek alternative off-farm income</li> <li>• Find suitable land for increased rice yield, inter cropping, crop rotation and improve soil fertility</li> <li>• Efficient use of household labors</li> <li>• Exchanging labor between farmers community</li> <li>• Raising livestock for selling and buying rice when harvesting rice not meet household consumption needs.</li> <li>• Cash crop production for household income</li> </ul>

**Source:** Focus group discussion (2014)

#### 5.5.2 The upland rice with rubber plantation (URRP)

URRP had slightly better coping strategy than rubber plantation alone, which rice field and other crops (job's tear and maize) provided the sources of income for buying food for household. Rice production was an important food crop for all farming to meet the household food consumption needs. Other hand rubber plantation was last profit from farm, because of rubber plantation produced the latex (begin at above year sixth from planted).

Rubber plant could contribute to vulnerability to food availability due to expand other land of farm production. Therefore, farmer in this farm type had to consider the size of crop production and land allocation for cultivating rice, maize, job's tear and rubber. This farm type was concerned in livelihood assets that included farmer's knowledge and skill, natural capital, financial capital, physical capital and social capital.

The managing of farm field to had great successfully from farm production that required advantage of farmer's ability (labour management and proper cropping calendar times). This could continue to cultivate crops production in the farm. The disadvantage of this farm type was small scale of crop production as well as small holder rubber plantation



farming when compared two another farm types: upland rice subsistence farming and larger rubber plantation farming system. However food shortage was found also in this farm type that had one to two months before new harvesting of rice production. Many farmers used to collect the non-timber forest products such bamboo shoot, mushroom and other wild vegetables for sell as cash income and food for household consumption.

**Table 5.17 Household future coping strategy in URRP farming type**

Farm type	(B) Upland rice with rubber plantation (URRP)
<i>Future coping strategy</i>	<ul style="list-style-type: none"> <li>• Purchase and borrow rice from relative cuisine and from villager rice funding</li> <li>• Selling labour to another farm for generating income to support household expenditure and buying food for household</li> <li>• Farmers should cultivate food production with inter cropping in rubber farms</li> <li>• Rent or borrow land from other farmers or relative farmers</li> <li>• Raising livestock for selling and buying rice when harvesting rice not meet household consumption needs.</li> </ul>

**Source:** Focus group discussion (2014)

### 5.5.3 Rubber plantation farming type (RP)

RP farming type was concerned the ability of farmer working and earning cash for buying food for household consumption needs. This factor could enhance profits from rubber plant that had given yield from above 5-6 years after planting. For this reason, farmer needed good coping strategy for meet household need on food security before tapping rubber tree.

These solutions could help farmer to get better coping strategies on their farm production and investment in the future. During the focus group discussion, the most of rubber farming were unable to cultivated rice and other crop in their farms. Because of rubber plant was fully growth. From this reason farmers had to looking for another land for cultivating rice as well as rent a land or borrowing land from relative family.

**Table 5.18 Household future coping strategy in RP farming type**

Farm type	(C) Rubber plantation (RP)
<i>Future coping strategy</i>	<ul style="list-style-type: none"><li>• Selling the rubber latex to marketing for generating income</li><li>• Buying rice instead of cultivation upland rice</li><li>• Rent or borrow land from other farmers or relative farmers</li><li>• Selling labour to another farm for generating income to support household expenditure and buying food for household</li></ul>

**Source:** Focus group discussion (2014)

Farmers in this farm type had to spend their times working only in the rubber farms. Size of family member could determine the working task and labours shortage in the farm activities. Therefore, farm size and production from farm were influent to their incomes and their assets for buying food and rice to meet the household consumption needs.

A greater outcome per hectare of rubber plantation referred to relationship between labours from family and farm size. Other limitation on this farm type, farmer could not keep their livestock in their farm field due to harmful in herbicide used in rubber plantation. This farm type was exposed to vulnerability to food insecurity as well as lack of food availability, food access and food utilization in these areas.

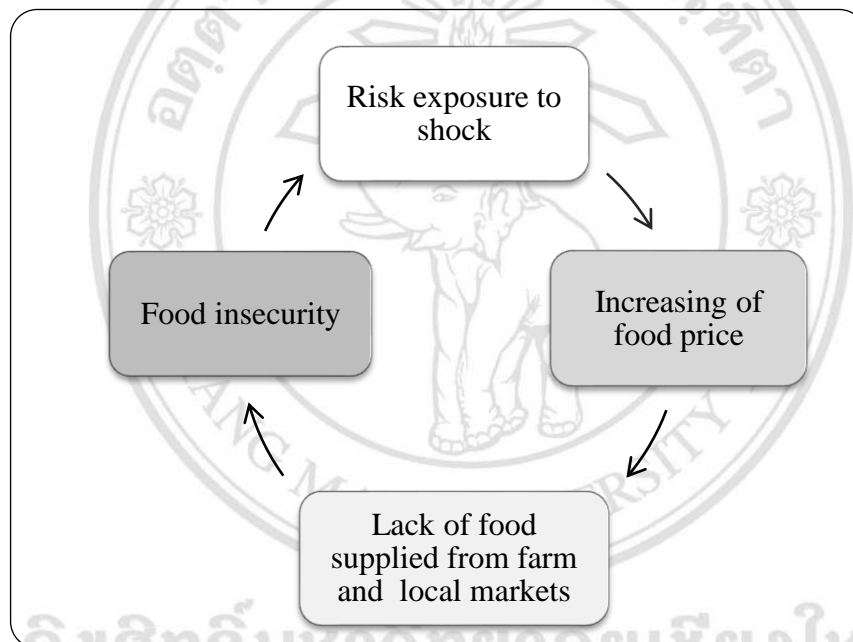
### **5.6 Household food insecurity context and discussion**

The village communities played directly role in the case of food shortage in their villages. The some household had been facing the period of food shortage situation that referred to lack of food crop production and unable to buy food from markets. These problems could link to vulnerability to food insecurity as well as lead to risk exposure to shock and increasing food prices in the local markets (Figure 5.4).

Widely outcome from farm production lead to greater ability to coping strategies. When used this facing to vulnerability to food insecurity. In term of food shortage periods that

could happen in these three farm types. From survey found that ability to cope with food insecurity through loan rice from the villagers communities in the villages (villager's rice bank). In some case of household, if they had availability of livestock that sold immediately their animals to generate cash or buy food to overcome food shortage periods.

Therefore, upland rice subsistence farming (UR) and upland rice with rubber plantation farming type (URRP) were more opportunity to cope with food insecurity while these farm types were widely biodiversity in their farm. For this reason, rubber plantation alone was great more chance to exposure to risk context to food insecurity in this region.



**Figure 5.4** The risk context to food insecurity

**Source:** Focus group discussion (2014)

### 5.7 Responeded of coping strategy

The transition of upland rice subsistence farming systems to mono-cropping as rubber farming system, that had an impact on household food security and changing natural resources. Upland rice with other crops (UP), upland rice with rubber plantation (URRP) and rubber plantation showed similar characteristic of household food insecurity which caused by ability of farmers to grow and resolved the food insecurity period for their household.